DOE Computer Graphics Forum 2012 Site Survey

Site Name: Lawrence Livermore National Laboratory

Site Division or Group: Computation: Data Group, Information Management and Graphics Group, Center for Applied Scientific Computing (CASC)

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Group Overview

Mission:

The Data group provides data analysis and visualization support to its customers. This consists primarily of the development and support of VisIt, a data analysis and visualization tool. Support ranges from answering questions about the tool, providing classes on how to use the tool, and performing data analysis and visualization for customers.

The Information Management and Graphics Group supports and develops tools that enhance our ability to access, display, and understand large, complex data sets. Activities include applying visualization software for large scale data exploration; running video production labs; supporting graphics libraries and tools; maintaining PowerWalls and other displays; and developing software for searching and managing scientific data, as well as providing easy-to-use interfaces to HPC resources.

Researchers in the Center for Applied Scientific Computing (CASC) work on various projects including the development of visualization techniques for large scale data exploration that are funded by the ASC program, among others. The researchers also have LDRD projects and collaborations with other lab researchers, academia, and industry.

Past Year's Activities:

The IMG group is located in the simulation facility that houses Sequoia, Zin (TLCC2), and many other platforms. The facility includes visualization theaters, a visualization computer floor and deployment workshop, and video production labs.

We continued to provide the traditional graphics group consulting and video production support. We maintained five PowerWalls and many other displays. We supported edge, a 216-node Westmere/IB cluster with NVDIIA Tesla M2050 Gus and more than 20TB of memory, providing a visualization production server on our unclassified network. We continue to support a 576-node Opteron/IB cluster with 72 TB of memory on our restricted network, as well as several smaller clusters to drive the PowerWalls. The visualization production systems includes NFS servers to provide dedicated storage for data analysis and visualization.

The ASC projects have delivered new versions of visualization and scientific data management tools to end users and continue to refine them. VisIt had multiple releases during the past year.. We released new versions of Hopper, a Java application for managing and transferring files. We released versions of Lorenz, also known as MyLC, a web-based interface to our HPC resources and services. We continue to use and develop Blockbuster and Telepath. Both the VisIt and IMG teams were engaged in a variety of movie production efforts during the past year in addition to the development tasks.

Information on these tools and efforts can be found on our web pages http://www.llnl.gov/icc/sdd/img/infrastructures.shtml and at the VisIt site: https://visit.llnl.gov.

Plans and Priorities:

We will release new versions of the various in-house tools we support. We will continue to provide consulting and support services in graphics and video production.

Research into visualization techniques continues, funded largely by sources other than the ASC program. The research priorities for next year include topological analysis for scientific computing, particle visualization, data compression, uncertainty quantification, and mentoring students in various areas related to the above.

Funding Sources

The IMG Group is funded by ASC as well as other "institutional" sources. CASC is funded by LDRD, ASC, other LLNL projects, and outside sponsors. The Data group is funded by ASC, SciDAC, NEAMS, and other outside sponsors.

Current Resources

Hardware:

Compute servers: See http://www.llnl.gov/computing/hpc/resources/ for details on the compute servers and storage systems.

Production visualization servers: We have one unclassified and two classified production visualization servers, one small development server with GPUs (M2070s), three classified PowerWalls with dedicated clusters to drive them, and two unclassified PowerWalls with dedicated clusters to drive them.

Graph Linux production cluster: 576 nodes (24 2.0 GHz Opteron (quad-socket, six core Istanbul),128GB RAM per node), InfiniBand, shared Lustre disk, total of 72 TB memory

Edge Linux production cluster: 216 nodes (12 2.8 GHz Westmere (dual-socket, six core), 96GB RAM per node), InfiniBand, nVidia Tesla M2050, shared Lustre disk, total of 20TB memory

Video production: Our two labs include PCs, Macs, desktop video editors, and assorted recorders, monitors, mixers, and software packages. Visualization developer's lab: Assorted small systems and a 15-panel display driven by multiple Linux clusters.

Desktop systems for visualization consist of diskless and diskfull Linux, Mac and Windows systems, with Linux the being the most common.

Software:

VisIt, EnSight, IDL, Tecplot, AVS, assorted other utilities and translators, and Blockbuster. SDM software includes Hopper, Chopper, and tools used in the Green Data Oasis.

Blockbuster: http://blockbuster.sourceforge.net/

Hopper: https://computing.llnl.gov/resources/hopper/

VisIt: https://visit.llnl.gov

Staff:

In the Information Management and Graphics Group (led by Jeff Long, with Becky serving as vis project and CSSE lead and LC deputy) there are 9 people: five developers working on scientific data management tools and four people on the vis team. In the DATA group (led by Eric) there are 5 people supporting VisIt. In CASC there are several visualization and data analysis researchers (Dan Laney, Group Leader), along with ongoing collaborations with several graduate students. No hires are planned for the development groups but we may hire a researcher this year.

Planned Growth

Hardware Acquisitions

We may acquire a machine with GPUs on the classified network this year. If not, then we will plan for this in the following fiscal year.

Software Acquisitions

None are currently on the list, other than GPU-enabled versions of existing packages.

Personnel Acquisitions

We may hire an additional visualization researcher. No new developer hires are planned.

Additional Comments